Trend Study 16C-24-04

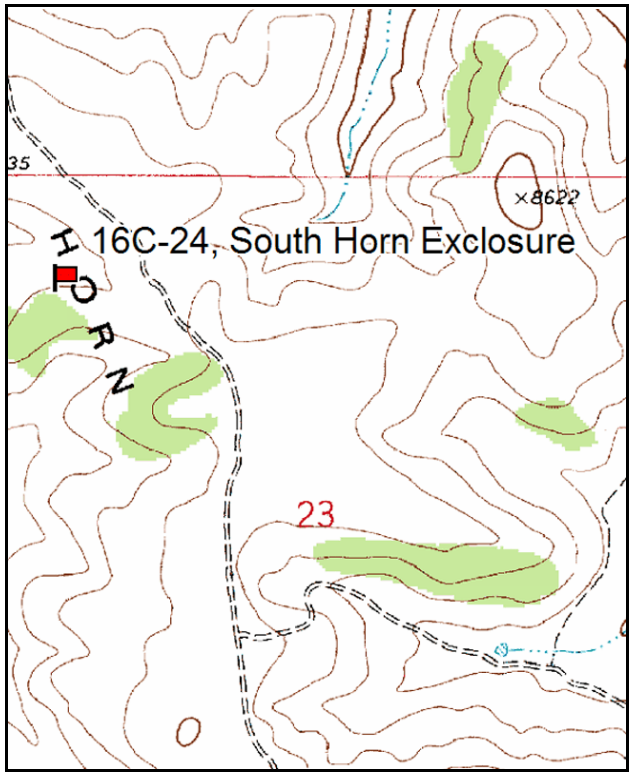
Study site name: South Horn Exclosure . Vegetation type: Mixed Mountain Brush .

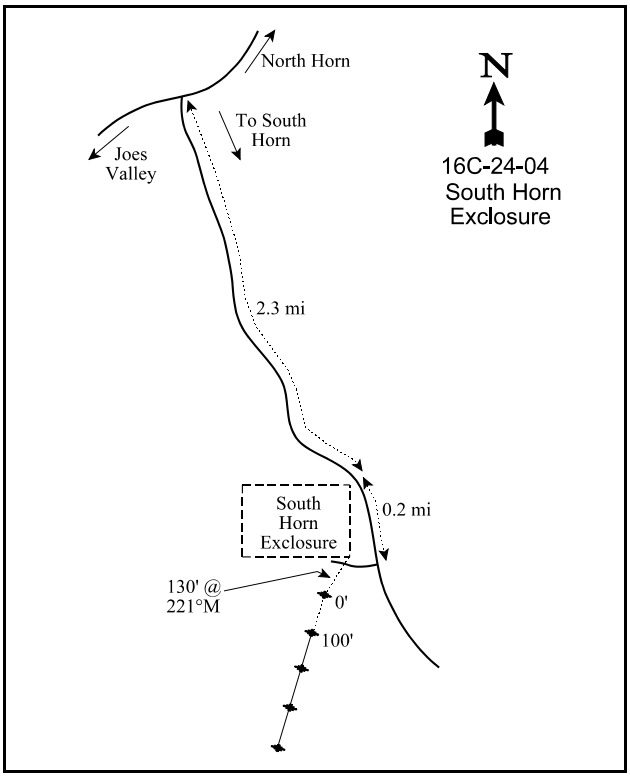
Compass bearing: frequency baseline 206 degrees magnetic.

Frequency belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

From the intersection of the North Horn and South Horn roads, turn right (south) onto the South Horn road (#21). Proceed 2.3 miles to the NE corner of an exclosure. Continue 0.2 miles past the exclosure to a faint road. Turn right onto this faint road and go 0.15 miles to the SE corner of the exclosure. The 0-foot baseline stake is approximately 130 feet southwest (221°M) of the SE corner.





Map Name: The Cap

Diagrammatic Sketch

Township l9S , Range 6E , Section 23

GPS: NAD 27, UTM 12S 4334205 N, 480762 E

DISCUSSION

South Horn Exclosure - Trend Study No. 16C-24

The South Horn Exclosure study samples a mixed mountain brush community dominated by true mountain mahogany and scattered old pinyon pine. The study is located on the south side of the South Horn Mountain Exclosure. It has a gradual 5% slope and a northwest aspect with an elevation of 8,500 feet. The site is representative of north slopes in the area which support a higher density of true mountain mahogany. The area is primarily used by elk in the winter, although sign of mule deer is also frequent. Rabbit sign is abundant. Grazed in the summer by cattle on the Horn Mountain allotment, this particular area receives less cattle use than the seeded sagebrush flats. Pellet group data from 1999 estimate 32 deer, 33 elk and only 3 cow days use/acre (79 ddu/ha, 82 edu/ha, and 7 cdu/ha). All cow pats were from last season. All of the deer and elk pellet groups appeared to be from the last winter. Pellet group data from 2004 estimated 23 deer, 29 elk and 5 cow day use/acre (56 ddu/ha, 73 edu/ha, and 13 cdu/ha). Elk and deer pellet groups appear to be from last winter and spring. Cow use were from this year.

Soil on the site is relatively shallow (effective rooting depth of just over 9 inches) and very rocky throughout the profile. The upper 6 inches is a visibly darker soil, beyond this, it is a light colored fine sand. Overall soil texture is a sandy loam with a neutral pH (6.8). Phosphorus and potassium are limited at just 4.2 ppm and 32 ppm respectively. Values less than 10 ppm for phosphorus and 70 ppm for potassium can limit normal plant growth and development. The majority of the soil surface is protected by vegetation and associated litter. The bare shrub interspaces do experience some soil loss and runoff, but the problem is not widespread or severe.

The site supports a variety of browse species. The key species include true mountain mahogany, serviceberry, and mountain big sagebrush. Mountain mahogany is represented by a small population of mostly mature plants which average a little over four feet in height, making some plants partly unavailable. They number an estimated 1,800 plants/acre in 1988 and only 200 plants/acre by 1994. The change in density is a reflection of the much larger sample taken in 1994, which gives a more representative sample of aggregated and/or clumped shrub populations with discontinuous distributions. Density increased slightly to 320 plants/acre in 1999 to 340 plants/acre in 2004. The true mountain mahogany are in good vigor and display moderate to heavy hedging.

Mountain big sagebrush is the most common shrub on the site and some of the more open areas are completely dominated by it. It provided 36% of the shrub cover in 1994, 47% in 1999, and 43% in 2004. The sagebrush population in 2004 numbered 1,680 plants/acre with fair vigor and light to moderate hedging. Snowberry and Utah serviceberry are present at low densities. Mature serviceberry are fairly large averaging 4.5 feet in heigh making some plants partly unavailable. There are also some large tree-like curlleaf mountain mahogany. Both serviceberry and curlleaf mountain mahogany display moderate to heavy use on forage that is available. Large and very old pinyon and juniper trees are scattered throughout the site. Point quarter data from 2004 estimate 34 pinyon trees/acre. Average diameter of pinyon is estimated at 14 inches. Overhead canopy cover is variable, but averages 17% for pinyon and 3% for juniper.

The herbaceous understory is diverse but not very abundant, but expected with pinyon-juniper canopy cover at 20% (Tausch 1994). At this cover value, it has a negative effect on the herbaceous understory. Eleven species of grasses were encountered in 2004 and produced less than 2% cover. Twenty-one species of forbs provided only an additional 5% cover. The most abundant grasses include, Salina wildrye, mutton bluegrass, and Indian ricegrass. Common forbs include annual stickseed, little flower collinsia, and Douglas knotweed.

1994 TREND ASSESSMENT

Litter cover has decreased but is still extensive at 61%. Bare ground increased slightly with browse offering

most of the vegetative cover. Soil trend is still considered stable. Mountain big sagebrush has a stable mature population that is being effected by the associated pinyon-juniper canopy cover and extended drought. Percent decadence is moderately high at 38%. Recruitment of young into the population is down. However, the other associated browse species are doing well considering the drought. Therefore, trend for browse is considered stable. Perennial grasses and forbs have significantly decreased in nested frequency values indicating a slightly downward herbaceous understory trend. The Desirable Components Index rated this site as very poor with a score of 35 due to few young shrubs, high decadency, and low grass and forb cover.

TREND ASSESSMENT
soil - stable (3)
browse - stable (3)
herbaceous understory - down slightly (2)
winter range condition (DC Index) - 35 (very poor) Mountain brush type

1999 TREND ASSESSMENT

Trend for soil is up slightly due to a decline in relative percent bare ground from 22% to 15% and an improved ratio of bare soil to protective cover. Vegetation cover has gone up, but most of the improvement comes from shrubs and trees, which increased in cover from 14% in 1994 to 24% in 1999. Herbaceous plants, which are more effective at holding soil in place, increased in cover from 6% to 9%. Localized erosion is occurring, although it is not a problem. Trend for browse is up slightly. Density of mountain big sagebrush has increased, recruitment is improved, and percent decadence has declined from 38% to 6%. True mountain mahogany is more heavily hedged but density has increased slightly, vigor is normal, and reproduction has improved. Serviceberry has also increased in density. Most of the plants are very large and partially unavailable to browsing. Available portions of these shrubs display moderate to heavy use. Trend for the herbaceous understory is stable. Sum of nested frequency of perennial grasses has remained similar to 1994 estimates, although nested frequency of perennial forbs increased slightly. Composition is diverse and very similar to 1994 with herbaceous plants only producing about 9% cover. The Desirable Components Index rated this site as fair with a score of 59 due to an increase in shrub cover, a decrease in decadency, and an increase in grass and forb cover.

TREND ASSESSMENT
soil - up slightly (4)
browse - up slightly (4)
herbaceous understory - stable (3)
winter range condition (DC Index) - 59 (fair) Mountain brush type

1999 exclosure observations:

The nearby exclosure has more of a western aspect than the trend study site. The total exclosure contains a lot of curlleaf mountain mahogany which are about 4 to 6 foot in height. They do not appear to be producing seed and they contain many yellow leaves. There are a few decadent tree-like curlleaf. Visually, there appears to be little difference between outside and inside of the total exclosure with regard to sagebrush and grass cover and health. The livestock exclosure also appears to have similar health and vigor for sagebrush compared to outside. Grass composition and abundance also look similar. There are no curlleaf mountain mahogany in the livestock exclosure. A few large highlined serviceberry plants occur in the livestock exclosure.

2004 TREND ASSESSMENT

Trend for soil is stable. Bare ground has declined since 1999 (28%), but remains similar to 1994 relative cover

of 22%. Litter still provides 55% of relative cover as it did in 1994 and vegetation has decreased from 28% in 1999 to 19% relative cover in 2004 (same as 1994). Trend for browse is down slightly. Density of mountain big sagebrush has decreased, recruitment has declined, and percent decadence has increased from 6% in 1999 to 27 % in 2004. In addition, 70% (320 plants/ acre) of the decadent plants appear to be dying. Density of true mountain mahogany has remained relativity stable at 320 plants/acre in 1999 to 340 plants/acre in 2004. Utilization has increased to heavy use and young recruitment remains very low. Trend for herbaceous understory is down slightly. Composition of grasses and forbs is diverse, but account for very little cover. Perennial grasses and forbs have decreased in nested frequency, while annual forbs have increased in nested frequency. The Desirable Components Index rated this site as poor with a score of 44 due to an decrease in shrub cover and an decrease in grass and forb cover.

TREND ASSESSMENT
soil - stable (3)
browse - down slightly (2)
herbaceous understory - down slightly (2)
winter range condition (DC Index) - 44 (poor) Mountain brush type

HERBACEOUS TRENDS --
Management unit 16C, Study no: 24

Type	Species	Nested Frequency				Average Cover %		
		'88	'94	'99	'04	'94	'99	'04
G	Agropyron intermedium	b144	a7	a3	a-	.01	.00	-
G	Agropyron smithii	a-	a2	b84	a17	.03	.50	.11
G	Carex spp.	c46	ab14	bc23	a2	.11	.82	.04
G	Elymus salina	a-	c70	b43	b20	.71	1.59	.32
G	Festuca ovina	a-	b33	a3	a2	.36	.03	.03
G	Koeleria cristata	a-	b37	a6	a3	.33	.06	.04
G	Oryzopsis hymenoides	a-	b17	b21	b16	.57	.79	.13
G	Poa fendleriana	a-	b38	b58	b38	.29	.81	.81
G	Poa secunda	b60	a30	a13	a8	.52	.22	.18
G	Sitanion hystrix	-	6	-	6	.01	-	.01
G	Stipa comata	b56	a26	a5	a7	.50	.04	.10
G	Stipa lettermani	b11	a-	b9	a3	-	.12	.03
Total for Annual Grasses		0	0	0	0	0	0	0
Total for Perennial Grasses		317	280	268	122	3.48	5.02	1.82
Total for Grasses		317	280	268	122	3.48	5.02	1.82
F	Androsace septentrionalis (a)	-	a-	b49	a-	-	.18	.00
F	Arabis spp.	61	64	57	46	.29	.35	.24
F	Chenopodium album (a)	-	a-	a-	b35	-	-	.10
F	Chenopodium fremontii (a)	-	5	-	-	.01	-	-
F	Comandra pallida	29	24	20	31	.52	.60	.20
F	Collinsia parviflora (a)	-	a15	a10	b129	.05	.02	1.50

Type	Species	Nested Frequency				Average Cover %		
		'88	'94	'99	'04	'94	'99	'04
F	Crepis acuminata	$_{b}$57	$_{a}$6	$_{a}$16	$_{a}$1	.04	.10	.03
F	Cryptantha spp.	$_{b}$38	$_{a}$11	$_{a}$16	$_{ab}$33	.16	.27	.18
F	Delphinium nuttallianum	$_{b}$13	$_{a}$-	$_{a}$-	$_{a}$-	-	-	-
F	Eriogonum alatum	$_{b}$23	$_{ab}$20	$_{ab}$15	$_{a}$4	.34	.31	.18
F	Eriogonum cernuum (a)	-	5	2	-	.01	.03	-
F	Erigeron eatonii	$_{b}$75	$_{a}$48	$_{a}$42	$_{a}$22	.37	.24	.13
F	Erigeron spp.	-	5	-	-	.01	-	-
F	Erigeron pumilus	-	-	-	2	-	-	.00
F	Eriogonum umbellatum	$_{b}$13	$_{a}$1	$_{a}$1	$_{a}$2	.00	.03	.03
F	Gayophytum ramosissimum(a)	-	9	-	4	.06	-	.01
F	Heterotheca villosa	-	-	5	6	-	.21	.09
F	Lappula occidentalis (a)	-	$_{a}$-	$_{a}$5	$_{b}$29	-	.01	.70
F	Lupinus spp.	4	-	-	-	-	-	-
F	Machaeranthera canescens	$_{b}$18	$_{a}$2	$_{a}$-	$_{a}$-	.03	.03	-
F	Oenothera spp.	-	-	-	8	-	-	.33
F	Penstemon humilis	$_{b}$25	$_{a}$2	$_{a}$5	$_{a}$-	.01	.03	-
F	Penstemon spp.	-	-	-	7	-	-	.02
F	Penstemon watsonii	-	-	5	-	-	.12	-
F	Phlox austromontana	$_{b}$49	$_{a}$9	$_{a}$11	$_{a}$15	.21	.21	.34
F	Polygonum douglasii (a)	-	$_{b}$85	$_{a}$21	$_{c}$148	.14	.04	.38
F	Potentilla spp.	-	3	-	1	.00	-	.00
F	Schoencrambe linifolia	$_{a}$-	$_{b}$13	$_{c}$46	$_{b}$21	.05	.40	.08
F	Senecio multilobatus	$_{bc}$24	$_{a}$4	$_{c}$31	$_{ab}$10	.01	.19	.10
F	Sphaeralcea coccinea	-	4	9	-	.00	.02	-
F	Townsendia spp.	$_{b}$24	$_{a}$2	$_{a}$-	$_{a}$-	.03	-	-
Total for Annual Forbs		0	119	87	345	0.28	0.29	2.70
Total for Perennial Forbs		453	218	279	209	2.11	3.14	1.99
Total for Forbs		453	337	366	554	2.40	3.43	4.69

Values with different subscript letters are significantly different at alpha = 0.10

BROWSE TRENDS --
Management unit 16C, Study no: 24

Type	Species	Strip Frequency			Average Cover %		
		'94	'99	'04	'94	'99	'04
B	Amelanchier utahensis	2	6	5	2.32	1.83	2.03
B	Artemisia tridentata vaseyana	54	59	53	5.16	11.05	7.18
B	Cercocarpus ledifolius	3	4	4	-	.48	.18
B	Cercocarpus montanus	10	15	15	4.22	4.55	4.12
B	Chrysothamnus viscidiflorus viscidiflorus	18	16	26	.28	.24	.71
B	Gutierrezia sarothrae	7	5	6	.04	.21	.04
B	Juniperus osteosperma	-	-	-	.15	-	-
B	Leptodactylon pungens	11	11	10	.10	.54	.13
B	Mahonia repens	0	0	1	-	-	.06
B	Opuntia spp.	7	12	15	.07	.29	.26
B	Pinus edulis	0	1	1	1.46	2.76	.84
B	Purshia tridentata	2	2	1	-	-	-
B	Symphoricarpos oreophilus	13	16	14	.58	1.76	1.29
B	Tetradymia canescens	1	0	2	-	-	-
Total for Browse		128	147	153	14.41	23.74	16.87

CANOPY COVER, LINE INTERCEPT --
Management unit 16C, Study no: 24

Species	Percent Cover	
	'99	'04
Amelanchier utahensis	1.79	3.00
Artemisia tridentata vaseyana	-	8.76
Cercocarpus ledifolius	2.40	2.28
Cercocarpus montanus	2.00	7.73
Chrysothamnus viscidiflorus viscidiflorus	-	2.76
Gutierrezia sarothrae	-	.06
Juniperus osteosperma	2.79	3.00
Leptodactylon pungens	-	.33
Opuntia spp.	-	.33
Pinus edulis	15.39	17.20
Purshia tridentata	-	.33
Symphoricarpos oreophilus	-	1.68

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 16C, Study no: 24

Species	Average leader growth (in) '04
Amelanchier utahensis	3.2
Artemisia tridentata vaseyana	1.8
Cercocarpus montanus	5.6

POINT-QUARTER TREE DATA --
Management unit 16C, Study no: 24

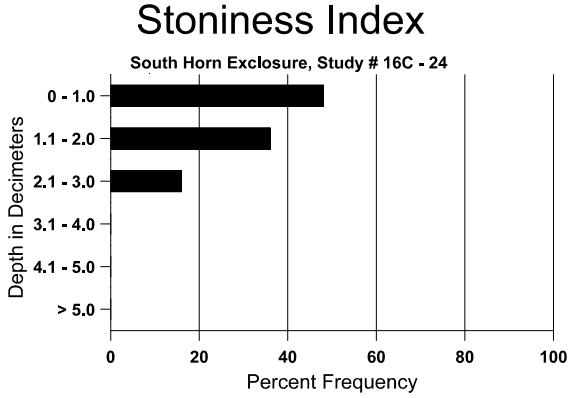
Species	Trees per Acre '99	Trees per Acre '04	Average diameter (in) '99	Average diameter (in) '04
Juniperus osteosperma	13	-	20.7	-
Pinus edulis	30	34	15.4	13.9

BASIC COVER --
Management unit 16C, Study no: 24

Cover Type	Average Cover % '88	'94	'99	'04
Vegetation	2.50	20.51	31.71	22.03
Rock	.75	.44	.89	.67
Pavement	.75	.05	.66	.72
Litter	75.00	61.38	62.79	62.39
Cryptogams	1.00	.54	.46	2.36
Bare Ground	20.00	22.79	17.32	25.20

SOIL ANALYSIS DATA --
Management unit 16C, Study no: 24, Study Name: South Horn Exclosure

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	PPM P	PPM K	ds/m
9.3	47.7 (10.9)	6.8	76.7	11.4	11.8	0.8	4.2	32.0	0.5



PELLET GROUP DATA --
Management unit 16C, Study no: 24

Type	Quadrat Frequency		
	'94	'99	'04
Rabbit	52	55	22
Elk	30	13	16
Deer	23	26	14
Cattle	1	-	-

Days use per acre (ha)	
'99	'04
-	-
33 (82)	29 (73)
32 (79)	23 (56)
3 (7)	5 (13)

BROWSE CHARACTERISTICS --
Management unit 16C, Study no: 24

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Amelanchier utahensis												
88	**333**	200	200	133	-	-	40	0	0	-	0	42/31
94	**40**	-	-	20	20	-	0	0	50	-	0	82/103
99	**120**	480	20	80	20	-	50	17	17	17	17	93/90
04	**200**	-	100	80	20	-	0	50	10	10	10	55/54
Artemisia nova												
88	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**0**	-	-	-	-	-	0	0	-	-	0	-/-
04	**0**	-	-	-	-	-	0	0	-	-	0	13/38
Artemisia tridentata vaseyana												
88	**1866**	533	200	1266	400	-	14	4	21	1	4	16/22
94	**1820**	20	40	1080	700	760	3	0	38	10	10	28/35
99	**2540**	160	360	2020	160	880	33	0	6	.78	5	21/31
04	**1680**	20	120	1100	460	660	29	7	27	19	19	18/27
Cercocarpus ledifolius												
88	**0**	-	-	-	-	-	0	0	0	-	0	-/-
94	**80**	-	60	-	20	-	50	25	25	-	0	76/53
99	**100**	-	40	60	-	20	20	20	0	-	0	15/20
04	**100**	-	60	20	20	-	0	80	20	-	0	41/41
Cercocarpus montanus												
88	**1800**	1333	800	1000	-	-	48	7	0	-	0	51/58
94	**220**	-	-	200	20	20	45	0	9	-	0	55/60
99	**320**	40	-	240	80	20	50	50	25	6	6	50/54
04	**340**	-	-	340	-	60	0	71	0	-	0	52/57

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Chrysothamnus viscidiflorus viscidiflorus												
88	**1599**	66	733	666	200	-	8	0	13	1	4	8/11
94	**640**	-	-	600	40	40	6	3	6	-	16	20/28
99	**580**	-	80	500	-	-	0	0	0	-	0	11/14
04	**1020**	-	20	960	40	-	4	4	4	-	4	11/16
Cowania mexicana stansburiana												
88	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**0**	-	-	-	-	-	0	0	-	-	0	-/-
04	**0**	-	-	-	-	-	0	0	-	-	0	24/43
Gutierrezia sarothrae												
88	**1733**	400	733	800	200	-	4	0	12	1	15	3/4
94	**400**	60	120	220	60	-	0	0	15	-	0	5/5
99	**380**	-	-	380	-	20	0	0	0	-	0	7/9
04	**440**	-	80	360	-	-	0	0	0	-	0	6/8
Leptodactylon pungens												
88	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**620**	-	80	540	-	-	0	0	-	-	0	5/8
99	**640**	-	-	640	-	-	0	0	-	-	0	4/5
04	**520**	-	-	520	-	-	0	0	-	-	0	6/8
Mahonia repens												
88	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	3/5
99	**0**	-	-	-	-	-	0	0	-	-	0	-/-
04	**160**	-	160	-	-	-	0	0	-	-	0	2/6
Opuntia spp.												
88	**7533**	133	1800	5133	600	-	0	0	8	1	39	2/4
94	**180**	-	40	140	-	-	0	0	0	-	0	2/5
99	**480**	40	80	400	-	-	0	0	0	-	0	2/5
04	**780**	-	20	760	-	-	0	0	0	-	0	3/9
Pinus edulis												
88	**0**	66	-	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**20**	40	-	20	-	-	0	0	-	-	0	-/-
04	**20**	20	-	20	-	-	0	0	-	-	0	-/-

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Purshia tridentata												
88	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**80**	-	-	80	-	-	75	0	-	-	0	9/16
99	**80**	-	20	60	-	-	0	100	-	-	0	17/25
04	**60**	-	-	60	-	-	0	0	-	-	0	13/22
Sambucus racemosa												
88	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	21/49
99	**0**	-	-	-	-	-	0	0	-	-	0	33/52
04	**0**	-	-	-	-	-	0	0	-	-	0	-/-
Sclerocactus whipplei												
88	**66**	-	-	66	-	-	0	0	-	-	0	1/3
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**0**	-	-	-	-	-	0	0	-	-	0	-/-
04	**0**	-	-	-	-	-	0	0	-	-	0	-/-
Symphoricarpos oreophilus												
88	**1666**	266	1400	266	-	-	12	8	-	-	0	15/9
94	**500**	-	20	480	-	-	12	0	-	-	0	9/19
99	**860**	60	600	260	-	-	0	0	-	-	0	14/22
04	**760**	-	240	520	-	-	11	0	-	-	0	10/25
Tetradymia canescens												
88	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**20**	-	-	20	-	-	0	0	-	-	0	10/11
99	**0**	-	-	-	-	-	0	0	-	-	0	7/24
04	**40**	-	-	40	-	-	0	0	-	-	0	8/15